# Worksheet 1 Programming Basics

## Task 1

1. All IDEs have slightly different facilities, but you can get an idea of them by trying out a built-in debugging module in Python.

   In this exercise you will try out the TRACE facility, which enables you to step through the program a line at a time and display the value of variables.

   Open your IDE and type the following Python program:

```
import pdb
a = 5
b = 10
c = 6
answer1 = a + b * c
print ("answer1 =", answer1)
answer2 = (a + b) * c
print ("answer2 =", answer2)
```

   **import pdb** imports the **P**ython **D**e**B**ugging module. At the moment, the program does not make use of the module.

   Run the program. It should print

```
answer1 = 65
answer2 = 90
```

   **(a) Set a trace, starting just before the line `b = 10`.**

   Insert the statement `pdb.set_trace()` between lines `a = 5` and `b = 10`

   Save and run the program again. When the program encounters the line `pdb.set_trace()`, it will stop, display the current statement (the line that will execute next), and wait for your input.

   You will see the pdb prompt,

```
(Pdb)
```

   **(b) Execute the next statement by typing `n` at the pdb prompt.**

   You can type `n` repeatedly, and it will execute one line at a time. Or, you can just press Enter, which will repeat the previous command.

   **(c) Print the value of the variables by typing `p <variable name>`**

   `e.g. p answer1`

   If you have not yet reached the line where answer1 is defined, you will get an error message.

   **(d) Turn off the pdb prompt by typing `c` (for "continue")**

   You can practise these commands on other programs that you write. For more instruction, go to

   https://pythonconquerstheuniverse.wordpress.com/2009/09/10/debugging-in-python/

## Task 2

2. Write an algorithm that will calculate the amount of paint required to paint a room. The user will enter the dimensions of the room, the total dimensions of the unpaintable areas (such as windows, doors or brickwork) and the number of coats of paint required.

   Assume that 1 litre of paint covers 11 sq m.

   You can get some handy tips from the site below:

   https://www.dulux.co.uk/en/decorating-tips-and-advice/how-to-calculate-the-right-amount-of-paint

## Task 3

3. Write pseudocode for a program which calculates the number of miles per gallon a car is doing. The user will input

   - the car mileage the last time the car was filled
   - the car mileage now
   - the total number of litres taken to fill the tank

   n.b. There are 0.22 gallons in a litre, or 4.546 litres in a gallon

   Which of the identifiers in your program could you define as

   (i) a constant? (What is the advantage of doing this?)

   (ii) an integer

   (iii) a real (decimal) number?

## Task 4

4. Write an algorithm using pseudocode that asks the user to input the number of students and the number of books to be equally divided between them. Calculate and output the number of books that each student will receive and the number left over.

5. Write pseudocode for an algorithm that prompts the user to enter a name, uses a string function to find its length and then tells the user how long the name is.

## Extension task

Write the program for Task 2, calculating litres of paint required. Practise using the debugging facilities in Python or an alternative language that you are using, or in the IDE itself.